



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,113	01/17/2006	Kiyohisa Takahashi	2003JP306	6143

26289 7590 12/28/2007  
AZ ELECTRONIC MATERIALS USA CORP.  
ATTENTION: INDUSTRIAL PROPERTY DEPT.  
70 MEISTER AVENUE  
SOMERVILLE, NJ 08876

EXAMINER
----------

HAMILTON, CYNTHIA

ART UNIT	PAPER NUMBER
----------	--------------

1795

MAIL DATE	DELIVERY MODE
-----------	---------------

12/28/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/565,113	Applicant(s) TAKAHASHI ET AL.	
	Examiner Cynthia Hamilton	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 05 October 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-2, 4-11, 13- is/are rejected.
- 7) ☒ Claim(s) 3, 5, 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 5, 2007 has been entered.
2. Claim 5 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Laurylpyridinium chloride is a cationic surfactant and thus not the required anionic surfactant or nonionic surfactant required in claim 4 upon which claim 5 depends. Thus, claim 5 with respect to Laurylpyridinium chloride is outside the scope of claim 4.
3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
4. Claims 1-2 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Dykstra (US 3,615,458) as optionally evidenced by Duncalf et al (Journal of Applied Polymer Science). With respect to instant claims 1-2 and 13, the Examples 5-9 of Dykstra anticipate the instant compositions wherein PVA (Elvanol 52-22 with 12% acetate), PVA (Vinavillol 42-88 with 12% acetate) or PVA (Rhodovil 50-125 with 11% acetate) are poly vinyl alcohol derivatives as

defined by applicants in the instant specification in first five lines of page 13 and thus water soluble polymers of the instant compositions, and water with either dimethylsulphoxide or N-methyl-alpha-pyrrolidone are the water and water soluble components of the solvent, and tetramethylammonium chromate is the amine compound and the crosslinker as well. The compositions of Dykstra et al anticipate the instant material and form patterns as well. With respect to the chromate salt being a crosslinker Dykstra and referenced as light-hardening in the second paragraph of col. 1. Duncalf et al is cited to show that workers of ordinary skill in the art recognize this "light-hardening" to be crosslinking as set forth in the Synopsis of Duncalf et al. Further, at page 13 mid page starting a new paragraph in applicant's specification, the water-soluble crosslinking agent "may be any one which can crosslink or cure the water soluble resin and form a developer-insoluble film by an acid". The acid in Dystra is a chromic acid and the developer is water and the resin is the PVA. The pH for the compositions are given as 7.2, 7.3, 9.8 and 9.3. Thus, with respect to tetramethylammonium salt, the compositions of Dykstra give a species which anticipates the compositions of instant claims 1-2 and 13.

5. Claims 1-2 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Verhille et al (3,725,061). With respect to instant claims 1-2 and 13, Verhille et al teach the formation of aqueous solutions with melamine-formaldehyde and/or urea-formaldehyde crosslinkers combined with a salt of a volatile base and a copolymer of vinyl acetate and a carboxylic acid. The only explicit example used ammonia to make the salt. However, in col. 4, lines 30-38, the volatile bases given to make the salts with the acid of the copolymers to cause aqueous solubility are inclusive of diethylamine and triethylamine, The formed solutions of the salts of these amines have a preferably pH of between 8 and 11. What is not explicitly disclosed

by Verhille et al is a composition wherein the salts of diethylamine or triethylamine are used, But the use of either in exchange for the ammonium salt of the examples of Verhille et al would have been prima facie obvious. The salt of diethylamine is a quaternary amine as is the salt of triethylamine. Thus, Verhille et al makes prima facie obvious the instant compositions for forming an aqueous medium for dispersion of photoconductive particles. The volatile base used to make the salt of the polymer is present to be driven away causing acid to be present and crosslinking to occur because of the loss of the volatile base. In Verhille et al, see particularly the Abstract, col. 2, lines 29-59, paragraph bridging col. 2-3, col. 3, lines 70 to col. 4, lines 49, and Example 1. The examiner notes that applicants reference acetate groups on polyvinyl alcohol as derivatives of polyvinyl alcohol on page 13 at the top thus the polyvinyl acetate copolymer of Verhille et al is taken as such a "derivative" even though the examiner understands as do workers of ordinary skill in the art that polyvinyl alcohol is usually made from polyvinyl acetate by hydrolyzation and thus polyvinyl alcohol is usually considered a derivative of polyvinyl acetate.

6. Claims 1-2, 4-8, 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kozawa et al (US 2004/0121259 A1 or EP 1 398 671 A1) in view of Verhille et al (US 3,725,061) or in view of Ho et al (7,033,735) and Miya et al (2003/0194639). US 2004/0121259 A1 is used under 35 USC 102(e) and EP 1 398 671 A1 is used under 35 USC 102 (a). They are essentially the same disclosure. The US document is cited below. With respect to instant claims 1-2 and 4-8, 11 and 13, Kozawa et al teach the instant compositions and methods with the exception of citing any of the nitrogen containing compounds of the instant compositions. The closest Example of Kozawa et al is found in Table 1 with thickening materials A and B wherein

tetrabutyl ammonium hydroxide is used along with crosslinkers and water soluble resins and surfactants. The methods used in [0165] to thicken the resist patterns make obvious all of the instant methods except the choice of nitrogen compound. In [0055], the quaternary ammonium salts set forth as generic for use in the compositions of Kozawa et al are not particularly limited but the only examples given are tetra isopropyl ammonium hydroxide and tetra butyl ammonium hydroxide. In [0010] near the bottom of the paragraph the reason given for the nitrogen compound being present in Kozawa et al is to neutralize the free acids present as to maintain a resist pattern thickening material of constant pH. Since the crosslinkers are to be activated by acid from the photoresist then to keep the resist pattern thickening material from crosslinking extra nitrogen compound must always be around thus yielding a pH of over 7 for stability reasons. What are other quaternary ammonium salts known to achieve this end in related arts which are like the examples given? The examiner believes workers of ordinary skill in the art of stopping premature crosslinking of melamine resins of this nature would see Verhille et al as art directed to solving a similar problem of keeping a composition from being acidic prematurely and thus causing premature cure. Verhille et al makes use of salts of methylamine, dimethylamine, and trimethylamine to achieve this end when neutralizing acidic polymers. In Verhille et al, see particularly col. 4 lines 10-55. Thus, with respect to instant claims 1-2, 4-8, 11 and 13, the use of any of the quaternary salts made from the volatile amines of Verhille et al would be recognized as useful quaternary ammonium salts for Kozawa et al which would be removed upon heating in the same nature as those of Verhille et al when forming the thickened layers around the resist images, Thus allowing free acid from the resist to flow into the compositions at heating and allow cure of the crosslinkers. The other word for what the amine in

Kozawa et al is doing is acting as a quencher. This is set forth in col. 9, lines 37-51, in Ho et al. Such quenchers are taught by Miya et al at [0206] and gives as preferred examples tetramethylammonium hydroxide as well as tetrabutylammonium hydroxide. Thus, with respect to instant claims 1-2, 4-8, 11 and 13, the use of the quencher of tetramethylammonium hydroxide for the acid scavenger, i.e quencher, of tetrabutylammonium hydroxide in Kozawa et al would have been the simple substitution of one known acid scavenger for another to obtain predictable results as taught by Ho et al in view of Miya et al.

7. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kozawa et al (US 2004/0121259 A1 or EP 1 398 671 A1) in view of Verhille et al (US 3,725,061) in view of Ho et al (7,033,735) and Miya et al (2003/0194639).. US 2004/0121259 A1 is used under 35 USC 102(e) and EP 1 398 671 A1 is used under 35 USC 102 (a) as applied to claims 1 or 4 above, and further in view of Ishibashi et al (US 6,319,853 B1). With respect to instant claims 9-10, the use of plasticizers in pattern thickening compositions like those of Kozawa et al is well known as taught by Ishibashi et al in col. 9, lines 29-55. Plasticizers are well known additives to add fluidity or flexibility to polymer compositions thus, the use of such for this reason in the compositions of Kozawa as taught by Ishibashi et al would have been prima facie obvious thus making the presence in compositions as set forth by instant claims 9-10 would have been within the skill of ordinary workers in the art when desired for the same reason.

8. Claims 1-2, 6, 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho et al (7,033,735) and Miya et al (2003/0194639). With respect to instant claims 1-2, 6, 11 and 13, Ho et al in col. 8, lines 44-68, and col. 9, lines 1-col. 10, lines 29, teach a species of the instant composition and method with the exception of disclosing any of the instant amines.

However, the use of a quencher in the compositions of Ho et al is required. Such a quencher is taught by Miya et al at [0206] and gives as preferred example tetramethylammonium hydroxide which is one of the quaternary ammonium salts of the instant claims. Thus, with respect to instant claims 1-2, 6, 11 and 13, the use of known quenchers for photoacid generators such as those of Miya et al as the quencher of Ho et al would have been the obvious use of known quenchers for the generic quencher required by Ho et al with the expectation of predictable results as taught by Ho et al.

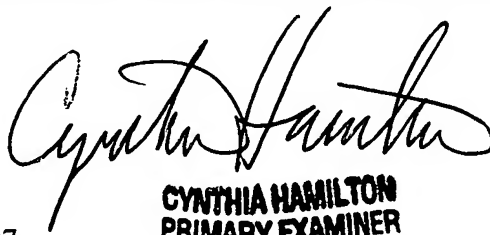
9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nozaki et al (US 2005/0031987) is cited as too late a reference to be prior art but shows the use of in Table 5 tetramethylammonium acetate as a phase transfer catalyst in thickening material like that of the instant application. Takahashi et al (US 6,902,862) teach in col. 79, last full paragraph, the use of ammonium salts inclusive of tetra-n-butylammonium hydroxide and tetramethylammonium hydroxide as photodecomposable base compounds for use in resists. No water is used as solvent in Takahashi et al. Kozawa et al (US 2006/0073419) is cited because of desire to control pH is taught but this reference is not prior art. Kozawa et al (2004/0072098) teach reasons for adding surfactants to resist pattern thickening materials which optionally contain crosslinkers and ammonium chloride type quenchers as well as amine type quenchers. In this Kozawa et al see particularly [0097] and Summary of the Invention.

10. Claims 3 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

*Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Hamilton whose telephone number is 571-272-1331. The examiner can normally be reached on Monday through Friday 8:30 am to 5:00 pm.*

*If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia H. Kelly can be reached on (571) 272-0729. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.*

*Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.*



**CYNTHIA HAMILTON  
PRIMARY EXAMINER**

Cynthia Hamilton  
Primary Examiner  
Art Unit 1795

December 22, 2007